REMARKS

Independent Claims 1, 19, 34, and 56 have been amended to recite an array of sensors configured to correspond to the magnetic field shape such that each sensor in the array is excited by a same magnitude and a same angle of flux when centered about the z-axis of the magnet. Support for this amendment is found on page 22, lines 1-6 and page 19, lines 21-25 of the application as filed.

Claim 2 has been amended for correct antecedent basis.

Claims 44 and 45 have each been amended to depend from claim 34 and to remove redundant subject matter. Support for the amendment is found in the claims as originally filed.

Claims 67-70 have been added. Each of these claims recites that the array of sensors comprises aligned, opposing pair members. Support for these claims is found on page 20, line 5 of the application as filed.

Claims 8, 9, 26, and 27 have been canceled herein. Claims 13, 15-17, 23-25, 29, 35, 36, 38, 48, 52 and 53 were previously canceled. Such cancellation is without prejudice on the merits to further prosecution of these claims in one or more continuing applications.

Claims 1-7, 10-12, 14, 18-22, 28, 30-34, 37, 39-47, 49-51, and 54-70 remain in the application.

Claims 19-22, 28, 30-33 and 56-66 currently stand withdrawn pursuant to the earlier restriction requirement.

Therefore, Claims 1-7, 10-12, 14, 18, 34, 37, 39-47, 49-51, 54-55, and 67-70 are now active in the application.

Rejection of Claims 1-10 and 18 under 35 U.S.C. §103(a) over Durham (U.S. Pat. No. 6,162,228) and Haynor (U.S. Pat. No. 6,216,028)

This rejection has been overcome by amendment of the claims.

Claim 1 has been amended to recite an array of sensors dimensioned and configured to detect the x-axis, the y-axis, and the z-axis wherein the array is configured to correspond to a magnetic field shape such that each sensor in the array is excited by a same magnitude and a same angle of flux when centered about the z-axis of the magnet.

Durham does not teach a sensor array with the structural characteristics recited in Claim 1. As explicitly acknowledged by the Office, Durham does not teach an array of sensors that detects the x-axis, y-axis, and z-axis (see page 3 of Office Action dated April 17, 2009). Applicants submit that Durham also does not teach an array of sensors configured to correspond to a magnetic field shape such that each sensor in the array is excited by a same magnitude and a same angle of flux when centered about the z-axis of the magnet.

Haynor also does not teach a sensor array with the structural characteristics recited in Claim 1 as amended. This is evident in view of the configuration of Haynor's sensors, the configuration of the sensors' magnetic sensing elements, and the method taught by Haynor for determining the location and orientation of an indwelling medical device within a patient.

Regarding the configuration of Haynor's sensors, Haynor teaches a tetrahedral configuration of sensors. This is shown in FIG. 4 of Haynor, reproduced below.

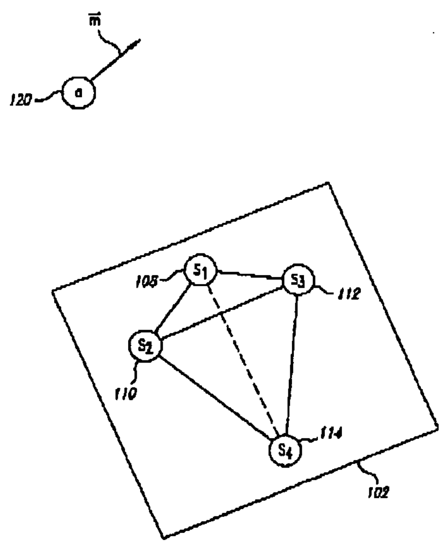

Fig. 4

Haynor

In this figure, elements 108-114 (sensors S_1-S_4) represent the sensors in their tetrahedral configuration, and element 120 represents a magnet. As is evident in FIG. 4, the tetrahedral configuration of the sensors does not allow for each sensor in the array to be excited by the same magnitude and the same angle of flux, whether the array is centered about the z-axis of the magnet or not. For example, if sensors S_1 (108), S_2 (110), and S_3 (112) are centered about the z-axis of the magnet, each of these will be excited by a different magnitude and a different angle of flux than sensor S_4 (114). The same principle applies if the sensors S_2 (110), S_3 (112), and S_4 (114) are centered about the z-axis of the magnet. In this case, sensor S_1 (108) will be excited by a different magnitude in addition to a different angle of flux than the remaining sensors. Thus, the tetrahedral configuration of sensors taught by Haynor does not fulfill the requirements of Claim 1.

Regarding the sensors' magnetic sensing elements, Haynor teaches that "each of the magnetic sensors 108-114 comprises three independent magnetic sensing elements orthogonally arranged to provide three-dimensional measurement in the x, y, and z directions, such as illustrated in FIG. 2" (column 5, lines 56-60 of Haynor). FIG. 2 of Haynor, which shows the three independent magnetic sensing elements taught by Haynor as *24x*, *24y*, and *24z* or *26x*, *26y*, and *26z*, is reproduced below for reference.

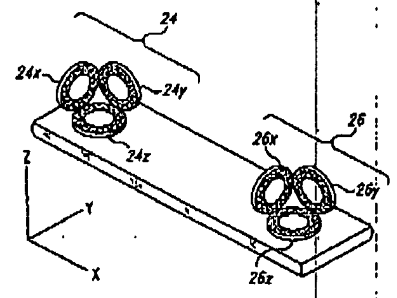

Fig. 2
(PRIOR ART)

Haynor

By definition, sensing elements that are orthogonally arranged cannot be excited by the same angle of flux when centered about the z-axis of the magnet. Thus, the orthogonal arrangement of the independent magnetic sensing elements taught by Haynor do not fulfill the requirements of Claim 1.

With respect to the method taught by Haynor, the method is directed to determining the location and orientation of an indwelling medical device within a patient. The method of determining the location and orientation of a medical device requires detecting **differences** in magnetic field strength and orientation between different sensors. Without the ability to detect differences in magnetic field strength and/or orientation between different sensors, one would not be able to determine the location and orientation of an indwelling medical device according to the method described by Haynor. Thus, not only does Haynor fail to teach a sensor array configured such that each sensor in the array is excited by a same magnitude and a same angle of flux when centered about the z-axis of the magnet, but a practitioner in the art would not be motivated to modify Haynor's device to have such a sensor array because it would render Haynor's device unsatisfactory for its intended purpose and change its principle of operation. Such a proposed modification is improper as established by *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984) and *In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA 1959). See MPEP §2143.01(V) and MPEP §2143.01(VI), respectively.

The fact that Haynor requires detecting differences in field strength between different sensors is evident throughout the reference. See, for example, lines 7-10 of the abstract column 4, line 32 through column 5, line 28. In these sections Haynor describes the requirement of determining magnetic field gradients for obtaining positional information. Haynor also describes in these sections methods of determining magnetic field gradients by measuring the difference in field strength between at least two different positions relative to the magnet. In addition, see column 7, line 30 through column 11, line 46 of Haynor, which provides a detailed description of Haynor's method. The method described in this section is most succinctly summarized in the following passage:

> The magnetic field strength B is measured at each of the locations S1 -S4 by the magnetic sensors 108-114, respectively. While only four magnetic sensors are illustrated in FIG. 3A to FIG. 5, the measurement may be generalized to n sensors such that each of the magnetic sensors provides a measurement of $B(s_i)$ at points s_i, where i=1 to n. The estimation processor 152 calculates quantities Δ_{ij} (measured)=$B(s_i)-B(s_j)$. This calculation provides a measure of the gradient from

> magnetic sensor i to magnetic sensor j and also cancels out the effects of the earth's magnetic field, which is constant (*i.e.*, gradient=0) at the magnetic sensor i and the magnetic sensor. The estimation processor 152 also calculates predicted values Δ_{ij} (predicted) from equation (1). The estimates for the values a [*i.e.*, magnet location] and m [*i.e.*, magnetic strength] are adjusted until the measured values Δ_{ij} (measured) and predicted values Δ_{ij} (predicted) match as closely as possible. (column 8, lines 30-45 of Haynor)

In short, Haynor here describes determining positional information by matching the predicted and measured differences in field strength between at least two sensors (Δ_{ij}). The difference in field strength between at least two sensors (Δ_{ij}) provides a measure of the gradient from magnetic sensor i to magnetic sensor j. The measured field strength gradient is used to determine the position of the magnet based on the known field strength properties of a given magnet over a set distance. Without the ability to calculate field strength gradient as provided by measured differences in field strength over a set distance (Δ_{ij}), one would not be able to determine positional information by the method of Haynor. Thus, Haynor's method requires the ability to measure differences in field strength over a set distance.

Configuring Haynor's device as recited in Claim 1 wherein each sensor in the array is excited by a same magnitude and a same angle of flux when centered about the z-axis of the magnet, would cancel any difference in field strength measured by the sensors over a set distance. This would destroy the ability to obtain positional information. Thus, one would not be motivated to modify Haynor's device in the manner recited in Claim 1.

In sum, the combination of Durham and Haynor fails to teach or suggest an array of sensors dimensioned and configured to detect the x-axis, the y-axis, and the z-axis wherein the array is configured to correspond to a magnetic field shape such that each sensor in the array is excited by a same magnitude and a same angle of flux when centered about the z-axis of the magnet. Applicants submit that Claim 1 and all claims depending therefrom are therefore not obvious over the combination of Durham and Haynor.

Withdrawal of this rejection is requested.

Rejection of Claims 11 and 12 under 35 U.S.C. 103(a) over Durham, Haynor, and Putative Admission (Applicant's Arguments/Response filed July 9, 2007)

This rejection has been overcome by amendment of the claims.

Claims 11 and 12 depend from Claim 1. As outlined above, the combination of Durham and Haynor fails to teach, suggest, or in any way render obvious the device recited in Claim 1 as amended. In addition, modifying the device of Haynor to contain the limitations recited in Claim 1 would improperly render Haynor's device unsatisfactory for its intended purpose and change its principle of operation. Thus, the combination of Durham and Haynor do not render obvious Claims 11 and 12.

Adding the putative Admission to the combination of Durham and Haynor still does not render obvious Claims 11 and 12 because the putative Admission does not refer to an array configured to correspond to a magnetic field shape such that each sensor in the array is excited by a same magnitude and a same angle of flux when centered about the z-axis of the magnet. Thus, the combination of Durham, Haynor, and the putative Admission does not render obvious Claims 11 and 12.

Withdrawal of this rejection is requested.

Rejection of Claim 14 over Durham, Haynor, and Hollis (U.S. Pat. 6,081,741)

This rejection has been overcome by amendment of the claims.

Claim 14 depends from Claim 1. As outlined above, the combination of Durham and Haynor fails to teach, suggest, or in any way render obvious Claim 1 or claims depending therefrom. In addition, modifying the device of Haynor to contain the limitations recited in Claim 1 would improperly render Haynor's device unsatisfactory for its intended purpose and change its principle of operation. Thus, the combination of Durham and Haynor does not render obvious Claim 14.

Further citing Hollis to the combination of Durham and Haynor still does not render obvious Claim 14. Hollis is specifically directed to a method and device for locating an **infrared light** emitter. See title ("Infrared Surgical Site Locating Device and Method) and column 2, lines 29-31. Infrared light does not generate a magnetic field having a shape comprised of a directional field and having a three-dimensional orientation on an x-axis, a y-axis and a z-axis, as recited in Claim 1 (and other independent claims). Therefore, configuring Hollis' array to correspond to a magnetic field shape such that each sensor in the array is excited by a same magnitude and a same angle of flux when centered about the z-axis of the magnet is not even possible for an infrared target. Because it is not possible, it cannot be obvious. Thus, the combination of Durham, Haynor, and Hollis do not render obvious Claim 14.

Withdrawal of this rejection is requested.

Rejection of Claims 34, 37, 39, 40-43, 46, 47, and 49-51 under 35 U.S.C. §103(a) over Durham, Haynor, and Putative Admission

This rejection has been overcome by amendment of the claims.

Claim 34 has been amended to recite an array of sensors dimensioned and configured to detect the x-axis, the y-axis, and the z-axis wherein the array is configured to correspond to a magnetic field shape such that each sensor in the array is excited by a same magnitude and a same angle of flux when centered about the z-axis of the magnet. Claims 37, 39, 40-43, 46, 47, and 49-51 depend from Claim 34.

As outlined above, the combination of Durham, Haynor, and putative Admission fails to teach or suggest an array of sensors dimensioned and configured to detect the x-axis, the y-axis, and the z-axis wherein the array is configured to correspond to a magnetic field shape such that each sensor in the array is excited by a same magnitude and a same angle of flux when centered about the z-axis of the magnet. Furthermore, modifying the device of Haynor to contain such a sensor array would improperly render Haynor's device unsatisfactory for its intended purpose and change its principle of operation. Therefore, Claim 34 and all claims depending therefrom, including 37, 39, 40-43, 46, 47, and 49-51, are not obvious over the combination of Durham, Haynor, and putative Admission.

Withdrawal of this rejection is requested.

Rejection of Claims 54 and 55 under 35 U.S.C. §103(a) over Durham, Haynor, Putative Admission, and Hollis

This rejection has been overcome by amendment of the claims.

Claims 54 and 55 depend from Claim 34. As outlined above, the combination of Durham, Haynor, and putative Admission fails to teach, suggest, or in any way render obvious Claim 34 as amended. Further citing Hollis to the above combination also fails to teach or suggest an array of sensors dimensioned and configured to detect the x-axis, the y-axis, and the z-axis wherein the array is configured to correspond to a magnetic field shape such that each sensor in the array is excited by a same magnitude and a same angle of flux when centered about the z-axis of the magnet. In addition, modifying the device of Haynor to contain such a sensor array would improperly render Haynor's device unsatisfactory for its intended purpose and change its principle of operation. Therefore, Claim 34 and all claims depending therefrom, including Claims 54 and 55, are not obvious over the combination of Durham, Haynor, putative Admission, and Hollis.

Withdrawal of this rejection is requested.

Rejection of Claims 44 and 45 under 35 U.S.C. §103(a) over Durham and Putative Admission

This rejection has been overcome by amendment of the claims.

Claims 44 and 45 have been amended to depend from Claim 34. As outlined above, the combination of Durham, Haynor, and putative Admission fails to teach or suggest the device recited in Claim 34 as amended. The subset of Durham and putative Admission also therefore fails to teach or suggest the device recited in Claim 34. In addition, modifying the device of Haynor to contain such a sensor array would improperly render Haynor's device unsatisfactory for its intended purpose and change its principle of operation. Therefore, Claim 34 and all claims depending therefrom, including Claims 44 and 45, are not obvious over Durham and putative Admission.

Withdrawal of this rejection is requested.

New Device Claims

Claims 67 and 69 have been added and depend from Claims 1 and 34, respectively. Applicants submit that because Claims 1 and 34 are not anticipated by or obvious in view of the cited prior art, Claims 67 and 69 are not anticipated by or obvious in view of the cited prior art.

Allowance of Claims 67 and 69 is requested.

Rejoinder of Method Claims to Device Claims

Method Claims 19-22, 28, 30-33, and 56-66 were previously withdrawn in response to a restriction requirement. Independent Claims 19 and 56 have been amended to include all the limitations of device Claim 1 and are commensurate in scope. Claims 68 and 70 have been added and depend from 19 and 56, respectively. Because the independent claims are commensurate in scope with Claim 1, and Claim 1 is not anticipated by or obvious over the cited prior art, Applicants submit that the method claims are also not anticipated by or obvious over the cited prior art. Applicants request rejoinder of withdrawn method claims upon allowance of the device claims. See *In re Ochiai*, 37 USPQ2d 1127, and *In re Brouwer*, 37 USPQ2d 1663.

CONCLUSION

In view of Applicant's amendments and Applicant's arguments submitted herein, it is believed that the above-referenced claims are now in condition for allowance. Notification of the same is respectfully requested. In addition, Applicants respectfully request the Examiner to withdraw his prior restriction requirement. If the Examiner has any questions at all with respect to Applicants' response, the Examiner is encouraged to contact the undersigned attorney. The undersigned attorney welcomes any attempt by the Examiner to come to a resolution of any yet outstanding issues.

Respectfully submitted,

Charles S. Sara, Reg. No. 30,492
Customer No. 25005
DEWITT ROSS & STEVENS S.C.
2 East Mifflin St., Suite 600
Madison, Wisconsin 53703-2865
Telephone: (608) 255-8891
Facsimile: (608) 252-9243

I hereby certify that this paper is being electronically submitted to the U.S. Patent and Trademark Office via the EFS-Web system on the following date:

Date of Electronic Submission ____________

Signature: ____________